APPENDIX F

Operation and Maintenance Plan, Remedial Design/Remedial Action,
Source Control Design dated October 2004

Operation and Maintenance Plan
Final Design Submittal

Remedial Design/Remedial Action
Source Control Design
City Disposal Corporation Landfill
Town of Dunn, Wisconsin

Prepared for:

Waste Management of Wisconsin, Inc.

October 2004

QUALITY
♦
INTEGRITY
♦
CREATIVITY
♦
RESPONSIVENESS

RUST ENVIRONMENT & INFRASTRUCTURE

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SECTION 1.0

INTRODUCTION

This Source Control Operation and Maintenance (O&M) Plan was prepared as a component of the Remedial Design/Remedial Action (RD/RA) for the City Disposal Corporation Landfill (CDCL) Site. This Source Control Design O&M plan provides guidelines for the long-term operation and maintenance of RD/RA components. This O&M Plan was prepared in accordance with the Record of Decision (ROD) and the Unilateral Administrative Order (and attached Statement of Work), signed September 28, 1992, and March 16, 1993, respectively. This plan was revised in October 2004 to reflect changes in monitoring and maintenance activities primarily related to landfill gas monitoring. Landfill gas generation has decreased significantly since completion of the SCOU.

The components covered in the CDCL Source Control O&M Plan include:

- Landfill Cover
- Surface Water Controls
- Landfill Gas Extraction
- Landfill Gas Monitoring

This CDCL Source Control O&M Plan was prepared prior to RA implementation; therefore, the construction "record" drawings and contractor submittals will be attached as addenda. Pertinent record drawings will be inserted in Appendix H following construction.

The Remedial Investigation (RI) Report and RD/RA Health and Safety Plan should be reviewed to obtain specific historical and safety related information. A separate Health and Safety Plan for the groundwater treatment plant has been prepared by BT^2.

SECTION 2.0

DESCRIPTION OF REMEDIAL DESIGN COMPONENTS

2.1 LANDFILL COVER

The CDCL Source Control landfill cover is constructed over the waste mass. The constructed landfill cover system includes:

- A minimum 6-inch grading layer over the waste mass to provide a minimum slope of 2 percent and a base for compaction of the low permeability clay barrier layer.
- A low permeability clay barrier layer, with a minimum compacted thickness of 24 inches, constructed to limit surface water infiltration, into the waste mass.
- A 40-mil High Density Polyethylene (HDPE) membrane placed over the low permeability clay barrier layer in Cells 6 and 12.
- A geocomposite drainage layer placed in Cells 6 and 12 directly over the geomembrane to allow drainage from within the final cover.
- An 18-inch thick frost protection and rooting zone soil layer. This layer protects the underlying compacted clay barrier layer from frost penetration.
- A soil layer consisting of a minimum of 6 inches of topsoil. Seed and fertilizer will be applied to this layer to establish a vegetative cover to reduce soil erosion.

2.2 SURFACE WATER CONTROLS

Surface water controls at the CDCL site include upgraded and new drainage ditches, culverts, and sedimentation control basins. Upgraded and new ditches will be grass-lined with minimum 0.5 percent slopes. Riprap will be maintained where surface water velocities can not be controlled by vegetation alone. Corrugated steel culvert drains are specified for installation where ditch drainage is not feasible. The two sedimentation basins will have spillways capable of handling a 100-year, 24-hour storm event.

2.3 LANDFILL GAS EXTRACTION SYSTEM

Landfill gas (LFG) is collected from an extraction well and trench network. The collected LFG is conveyed through buried high density polyethylene (HDPE) pipes (laterals) connecting to a common buried main HDPE header. The LFG is conveyed to a flare for combustion. Condensate from the LFG extraction system drains to two collection sumps and a collection manhole located at low points within the header system. Condensate is treated at the onsite treatment plant.

2.4 CONDENSATE EXTRACTION SYSTEM

LFG extraction system condensate is collected from the condensate collection sumps equipped with level-activated pumps. Condensate is pumped through small diameter force mains to a high point in the header system. From this point condensate flows by gravity to a condensate collection manhole located near the blower/flare station.

2.5 LANDFILL GAS MIGRATION MONITORING SYSTEM

Monitoring for potential LFG migration was conducted at selected points around the CDCL site for several years after completion of the SCOU remedial action. LFG migration has not been a problem and monitoring will be discontinued unless odors are detected and/or stressed vegetation is observed.

SECTION 3.0

OPERATION/CONTROLS

This section provides operation and procedural descriptions for the RA components and applicable system controls.

3.1 LANDFILL COVER

The CDCL source control cover is self operational with no specific controls. Inspection and Maintenance are discussed in Section 4.0.

3.2 SURFACE WATER CONTROLS

Surface water flow control is achieved with grass and riprap lined channels. Surface water control components require maintenance as discussed in Section 4.0. During construction the contractor is responsible for surface water accumulation and silt accumulation control.

3.3 LANDFILL GAS EXTRACTION SYSTEM

This section presents the startup and operation of the LFG extraction system. The LFG extraction system includes the well, wellhead assembly, transmission piping and valving, blower, and flare. The LFG extraction system components need to be operated simultaneously to result in a balanced system. Because of the declining landfill gas generation, it is anticipated that the landfill gas extraction system will need to be run in a run/rest mode (i.e. 200 minutes on 600 minutes off).

3.3.1 Startup

At system startup, the first operational criteria is to determine if each component of the LFG extraction system is functioning and correctly positioned. The first step in startup of the LFG extraction system is a static condition check, followed by dynamic balancing and monitoring adjustments. Upon completion of these startup steps, the system will be placed into operation.

3.3.1.1 Static Conditions

To check static pressures, close all valves in the LFG extraction system and record pressures at wellheads. Check the LFG condensate knockouts and risers to assure that the cover plates and caps are secured. Open all wellhead valves and transmission line valves. The butterfly valve at the blower (system throttling valve) should remain closed.

Measure the well field total static pressure and methane concentration 30 minutes after opening the valves at the sample port on the inlet side of the valve near the blower. If the total static pressure at this sample port is in excess of 32 inches water column (WC), operation of the blower may not be necessary because static LFG pressures are high enough to force LFG into the flare. If the static LFG pressure is in excess of 32 inches water column, the blower fan must be disconnected from the blower motor to protect the blower motor.

To disconnect the blower motor from the fan, remove the coupling on the shaft between the fan and the blower motor. This will allow the fan to free spin.

*** CAUTION ***

FAILURE TO DISCONNECT THE COUPLING AND ALLOWING THE FAN TO SPIN FREELY COULD DAMAGE THE ELECTRICAL SYSTEM AND THE BLOWER MOTOR.

If the methane concentration at the inlet to the blower is not sufficient for combustion of collected LFG at the flare, operation of the system needs to be modified. Depending on the actual concentrations of methane collected, operation of the LFG extraction system can be on a discontinuous schedule. In this situation, the actual operation time of the LFG extraction system depends on methane concentration and rate of methane production within CDCL.

*** CAUTION ***

CARE SHOULD BE USED WHEN METHANE LEVELS ARE BETWEEN 5 AND 15 PERCENT. UNDER THESE CONDITIONS, A METHANE/AIR MIXTURE IS EXPLOSIVE, AND ANY SPARK COULD SET OFF AN EXPLOSION IN THE SYSTEM. REFER TO HEALTH AND SAFETY PLAN FOR LANDFILL GAS HEALTH AND SAFETY PROCEDURES.

Continuous monitoring of the pressure and methane concentrations at the inlet side of the blower should be performed during initial start-up until LFG pressures fall below 12 inches WC, or methane concentrations are at flammable levels. At this point extraction by the blower is recommended and reconnection of the coupling on the motor shaft will be necessary to extract landfill gas. Static LFG conditions can also be determined at each well by closing the wellhead butterfly valve and measuring the static pressure, methane content, and oxygen content at the sample port on the wellhead. For a location of the sample ports see the Gas Wellhead Assembly detail Drawing No. 10 of the CDCL Source Control Design Plan Set.

3.3.1.2 Dynamic Conditions

When collected LFG methane concentrations are at flammable levels or the LFG extraction system pressure is below 12 inches WC, use of the blower will be required to create a vacuum on the LFG extraction system and maintain flare operation. To start the blower the following steps should be taken.

If the LFG extraction system was operating statically (under gas generation pressure) close the flame-out safety valve at the inlet to the blower. Reconnect the blower fan to the motor. Adjust the valves at each wellhead and the system throttling valve in the transmission line to settings established for blower operation. The flame-out safety valve at the blower is reopened using the electrical override and the blower is started. Well field pressures are regulated by repositioning the wellhead valves and transmission pipe system throttling valve.

At this blower startup stage the system should be monitored for oxygen intrusion throughout the LFG extraction system. Oxygen levels above 3 percent at the flare will indicate that the LFG extraction system is drawing air and the blower should be shut off. Many times, oxygen intrusion can be reduced by adjusting the butterfly valve at each well head. This will reduce the LFG gas flow and vacuum. Monitoring for percent oxygen at each well head during operation is required to identify which LFG extraction wells or trenches require less vacuum.

3.3.1.3 System Balancing

Adjust individual wellhead and header butterfly valves to maximize flow and minimize oxygen intrusion. This task will be performed as follows:

1. Adjust wells within one branch before moving to a different branch. Adjust branches furthest from the blower first and progress toward the blower/flare station.

Within each branch, adjust wells closest to the main header and progress away from the main header.

2. Monitor and record the following parameters as each well head is adjusted:
   - Vacuum
   - Oxygen concentration
   - Methane concentration
   - Valve setting

   Wells close to the blower station may have initial vacuums in excess of 32-inch WC. Adjust the valves on these wells to provide a 1 percent or less oxygen concentration. It is possible that even at a minimum valve setting, excessive oxygen is still present at certain wells. In this case a maximum of 5 percent oxygen at a single well is acceptable.
3. As the flow and vacuum throughout the LFG extraction system is adjusted during the balancing activities, there is the potential for conditions to change at a well that has been previously adjusted. Therefore, it is important to reverify oxygen levels in all wells within 24 hours of the initial adjustments. This is done to detect oxygen intrusion at an early stage in the system operation. If excessive oxygen is detected, adjust the well head butterfly valves until the oxygen is less than 1 percent at the well (with exception noted in 3.3.1.3.2.).

At the completion of balancing activities monitor and record the following parameters:

- Velocity (at the discharge side of blower)
- Vacuum (at well heads and blower inlet and outlet)
- Oxygen content (at well heads and blower outlet)
- Methane content (at well heads and blower outlet)
- Valve setting (at all well heads, at buried valves, and at the system throttling valve)
- Obtain LFG samples at the discharge side of blower in accordance with the LFG Monitoring Plan.

3.3.1.4 Startup Procedure for Flare

Start-up information on the flare is contained in Appendix C of this O&M Plan. The intent of this manual is not to repeat this information, but to summarize Appendix C.

Prestartup Checklist

1. Clean out all flare piping This includes both steel pipe and HDPE pipe.
2. Check to determine that the electrical system is adequately grounded.
3. Check that the ignition system is connected, operational, and that control valves are calibrated.
4. Check that the flame arrestor is in service.
5. Empty condensate at bottom of flame arrestor.
6. Check that the LFG methane concentration is sufficient for flare operation at the inlet side of the flame-out safety valve at the blower.

Manual Startup Checklist

1. Activate the control panel power and electrical feed to blower.
2. Switch the flare auto-ignite to active.
3. Start blower.
4. Initiate the flare auto-ignite when gas is flowing.
5. Balance throttling valves to adjust flame.

3.3.2 Normal Operation

After startup procedures have established a balanced well field and checks of automatic controls have been carried out, the LFG extraction system can be considered in operation. During operation, the system should have periodic inspection and maintenance as required.

3.3.2.1 Operational Checks

The following conditions should be checked quarterly:

- Flare ignition
- Blower amperage and blower flow rate
- Pressure at blower inlet and outlet
- Pressure at knockout locations

Other items will be included from time to time on the maintenance schedule and formal reporting inspections. Section 4.0 covers maintenance. Manufacturer's data is included in the Appendices. Monitoring is outlined in Section 6.0.

3.3.3 Sampling Procedures and Instrumentation

Sampling should be performed to determine the maximum LFG flow rate possible without an oxygen breakthrough of greater than 5 percent.

3.3.3.1 LFG Concentrations

Monitoring locations for LFG concentrations are sample ports which are installed in the header piping system.

3.3.3.2 Total System Gas Flow

The ability to measure LFG flow is provided in the LFG extraction system at the wellheads, at knock-outs, and at the flare. LFG flow is estimated by orifice plate measurements. See Section 6 for orifice flow measurement procedures and calculations.

3.3.3.3 Wellhead and System Vacuum

LFG sample ports which are installed on the well heads and knock-outs allow for the measurement of vacuum at different locations throughout the LFG extraction system. Vacuum and pressure measurements can be made with a gauge that reads in inches of water column. See Appendix G for manufacturer's literature on the pressure gauge. Care should be exercised when taking pressure or vacuum readings to keep the gauge level and upright.

3.3.4 Blower Flow vs. Amperage

As an operational requirement, LFG flow at the flare is important. Excessive LFG flow or oxygen intrusion could damage the system; not enough LFG flow and the flare will go out. Another LFG flow measurement technique is to correlate the amperage needed for the blower to operate with the LFG flow rate and pressure. Typically, as the LFG flow rate increases, the blower motor amperage requirement will increase as more power is required to operate the blower fan. Field testing is necessary to determine the LFG flow versus amperage correlation. The following procedure should be used for determining LFG flow based on amperage:

1. Adjust the system throttling valves to initial setting (1/4 open).
2. Start blower.

3. Measure total system LFG extraction system flow by measuring the differential pressure across the orifice as outlined in Section 3.3.3.2.
4. Measure blower inlet and outlet pressures.
5. Measure amperage draw at the blower motor with an ammeter.
6. Adjust the system throttling valve and repeat Steps 3 through 5.
7. Compare the data to the blower performance curve, supplied by the manufacturer, to determine that there is a reasonable correlation.

From this field test data, a table can be developed which correlates LFG flow with amperage. This information can be used to make periodic inspections of the blower and LFG extraction system performance.

3.4 CONDENSATE EXTRACTION SYSTEM

The condensate extraction system consists of well pumps, conveyance piping, connection to LFG header piping, and a condensate tank. The well pumps are submersible electric pumps. Condensate collected at two collection sumps within the LFG header system will be pumped to a condensate tank and stored near the blower flare station for removal and treatment in the on-site bioreactors.

3.4.1 Startup

The well sump pumps are installed at initial startup. All drip legs within the system are to be filled with water at initial startup to prevent vacuum loss in the sumps and manhole. The pumps are designed to be run separately and should not be started concurrently to avoid overloading the electrical system. The condensate system controls will allow only one pump to run at a time. Pumps will be activated automatically by liquid levels within the sump.

3.4.2 Operation

The condensate pumps are not expected to require operational adjustment. The correct liquid level at the condensate collection points should be checked periodically for proper on/off operation of pumps. The pumps are not explosion-proof and should remain completely submerged during all operations. The manufacturer's operation and maintenance information for condensate pumps is included in Appendix D.

3.5 LANDFILL GAS MIGRATION MONITORING SYSTEM

The LFG migration monitoring system consists of screened probes installed in the soil surrounding the landfill. The probes have no mechanical parts; therefore, operation is reliable and maintenance is minimal. Maintenance is described in Section 4.0 and sampling is described in Section 6 of this O&M Plan.

SECTION 4.0

MAINTENANCE

This section discusses the maintenance of the CDCL Source Control systems. Mechanical maintenance requirements will follow manufacturer's recommendations. These recommendations will be included as appendices to this manual after construction of the CDCL Source Control.

4.1 LANDFILL COVER SYSTEM

The CDCL landfill cover system consists of distinct soil and geosynthetic components including clay soil, 40 mil HDPE geomembrane, geocomposite drainage layer, rooting soil zone and topsoil. Maintenance of the CDCL cover system involves repair of settlement areas, areas void of vegetation, and areas affected by erosion.

4.1.1 Clay Cover Component

The following are steps to repair settlement where the clay barrier layer is affected:

1. Install temporary silt control and surface water controls downstream of where repairs are to occur.
2. Mark all underground features such as condensate, electrical, and LFG lines.
3. When excessive settlement is noted and clay barrier layer damage is suspected, remove and stock pile topsoil and rooting soil layers. Within Cells 6 and 12, removal and repair of the geocomposite and geomembrane may also be required. Segregation of all removed layers is necessary.
4. Clay soil can be added to the existing clay barrier layer or the existing clay can be excavated and appropriate fill placed to bring the area to acceptable grades. Adding clay is preferred since waste is not exposed and tie-in to adjacent clay is not necessary.
5. Document clay placement and compaction in accordance with the original Construction Quality Assurance Plan.
6. Repair and document geomembrane and geocomposite within Cells 6 and 12 as described in Section 4.1.2 and 4.1.3 of this O&M Plan.
7. Replace rooting zone and topsoil layers and revegetate.

4.1.2 40-mil HDPE Geomembrane

If the geomembrane layer has been punctured, the following steps are required to repair the geomembrane:

1. Follow Steps I, 2, and 3 of Section 4.1.1.
2. Untie and peel open the geocomposite layer to expose the damage. Cut/slice the geocomposite layer away only if necessary.
3. Weld patches over the damage in accordance with the original Construction Quality Assurance Plan, including all required testing.
4. Re-tie geocomposite drainage layer in place.
5. Follow Steps 4, 5, and 7 of Section 4.1.1.

4.1.3 Geocomposite Drainage Layer

1. Replace damaged geocomposite drainage layer and tie it to adjacent geocomposite drainage layer in accordance with the original Construction Quality Assurance Plan.
2. Follow Step 7 of Section 4.1.1. 4.1.4

4.1.4 Rooting Zone Soil and Topsoil Components

The rooting zone soils and topsoil may be impacted by erosion or by repairs to other components such as the LFG extraction piping. When maintenance is required, the amount of soil needed should be estimated and arrangements for stockpiling and delivery of rooting zone and/or topsoil should be made.

Temporary silt and surface water controls should be installed first. Initial regrading should be followed by a check of rooting zone and topsoil layer thicknesses. Final grading should provide positive drainage from the repair area. Seeding should be in accordance with Section 4.1.5 of this manual. Care should be taken during final grading to assure the area is tracked perpendicular to the slope to minimize channelization of surface water.

4.1.5 Revegetation

The seeding mix selected in the initial design and construction documents was based on vegetation varieties found to be successful in landfill conditions. However, weather and site conditions will require that some maintenance measures be followed to sustain healthy vegetation over the landfill. Reseeding may be necessary in bare areas created due to weather stress or construction activities. Revegetation will be performed as soon as practical with consideration of the local growing season and seasonal weather conditions.

4.1.6 Mowing

The seed mix selected for the landfill cover system will perform better if mowed. Mowing landfill vegetative cover limits the establishment of weeds and woody plants. Mowing will be performed on an as-need basis. Typically, when weeds or woody plants are noted in the inspection reports, action will be taken to limit their progression.

Initially, mowing will be performed to match the requirements of the vegetation in establishing a full and vigorous vegetative stand. Mowing will increase soil cover and help to minimize erosion. Mowing will also be performed at initial revegetation stages to remove initial cover vegetation. After the vegetation is established, mowing will be reduced to once or twice a year. Eventually, mowing may be discontinued.

4.1.7 Reseeding

If reseeding is required, the initial construction specifications seeding mix will be used. If reseeding is required in areas that were seeded with a temporary mix, no-till planters may be used. This method of seeding preserves the cover that exists and has been shown to successfully reestablish vegetation.

The seeding rate and species may require modification due to availability or site experience with initial vegetation species. The new mix will be based on sound agricultural practice and be selected to minimize the need for long-term care and maintenance.

4.2 SURFACE WATER CONTROLS

The surface water ditches require mowing and, from time to time, reshaping to better control the runoff. Mowing ditches and channels on the same schedule as the landfill cover will control excess vegetation within the ditches.

When erosion or siltation within the ditches restricts the growth of vegetation, silt removal will be required. Reshaping of the ditches to remove silt will be performed to allow conformance with the initial design cross-sections. Maintenance will be performed when an inspection report indicates that less than 1.5 feet of depth within a ditch exists. Sediment will be removed from the sedimentation basins when sediment levels reaches an average depth of 1-foot below the outlet structure. The original design sediment volume will be restored.

Erosion can create a gulleying condition in the ditches. Repairs to eroded ditches will be required when mowing access is limited. Spot repairs by hand shoveling and seeding may be done or the ditch can be regraded.

When regrading disturbs more than 100 linear feet of ditch, erosion mat or other erosion controls should be utilized to promote revegetation and prevent further erosion.

4.3 LANDFILL GAS EXTRACTION SYSTEM

4.3.1 LFG Header

Maintenance on the LFG header is expected to be minimal based on experience from other sites. The most typical concerns are crushing due to unexpected traffic or excavation, and water blockage.

Since the LFG header is designed as a loop system, repair on an individual segment or leg will only impact a small portion of the system. The repair area can be isolated by valves or temporary plugs.

Repair of the LFG header system will occur once a broken or blocked LFG header section is located. If a LFG pipe section is broken, it must be replaced. If a LFG pipe section is found to be blocked, it will need to be cleared. In areas where settlement has caused condensate to build up and cause blockage, the LFG header pipe will be elevated to the original designed slope. Repair to geosynthetic and soil components above the header pipe will be carried out as described in Section 4.1.

4.3.2 Flare

Scheduled inspection of the flare will report the physical condition of the stack metal and flame arrester. The stack will be replaced when excessive corrosion or perforation of the metal stack is noted. The flame arrester will be maintained in accordance with the manufacturer's requirements (Appendix C). During each inspection, the drain plug at the base of the flare stack will be opened. Any accumulated condensate will be collected and disposed in the condensate storage tank.

Maintenance of the area near the pad on which the flare is mounted will include removal of vegetation by spraying or cutting. Concrete surface maintenance will be limited to repairs on an as-needed basis.

4.3.3 Blower

The blower fan, coupling, and electric motor are a standard manufactured unit. Maintenance will be in accordance with the manufacturer's requirements (Appendix B).

4.3.4 Valves

The LFG transmission valves and valves at the wellheads are plastic. During inspections, the valve handle should be turned to determine if the valve is operable. Excessive resistance may mean partial blockage of the valve. Jetting or flushing the header pipe with water should clean the valve seats to allow operation. If the valve is still inoperable, it will be replaced.

At the wellhead, the valve operation can be checked by monitoring the pressure gauge. Record the initial reading on the gauge and then turn the valve toward the closed position. Note whether the gauge pressure changes. If pressure changes, return valve to the operation position as indicated by initial pressure reading. If no response is noted, the valve may need to be replaced. Checking of the valve operation can also be done by sound. Move the valve to closed position and monitor for leakage indicated by the sound of air moving through the valve. If leakage is occurring, replace valve.

4.4 CONDENSATE EXTRACTION SYSTEM

4.4.1 Pumps

The condensate extraction pumps will be maintained in accordance with the maintenance schedule. The maintenance schedule will be developed during the initial phase of operation. Maintenance will also be performed in accordance with the manufacturer's maintenance recommendations.

4.5 LANDFILL GAS MIGRATION MONITORING PROBES

The LFG probes will not require specific maintenance. Probes will be inspected when they are monitored. Any damage to LFG probes should be noted at this time and repairs or replacement as needed will be performed before the next monitoring event.

SECTION 5.0

POTENTIAL OPERATION CONCERNS

This section identifies potential problems with respect to the operation of the CDCL Source Control systems. When design related or equipment problems occur, the site personnel will contact the design engineer, installation contractor or vendor for assistance.

5.1 LANDFILL COVER SYSTEM

Since the landfill cover system is functional as placed, there are no potential operation concerns. Maintenance of the landfill cover system is discussed in Section 4.0.

5.2 SURFACE WATER CONTROL

To remain operational, the surface water control ditches will need to be maintained. Maintenance is discussed in Section 4.0. The greatest concern that could affect operation of the surface water control is that large storm events may cause erosion within the drainage channels. Regular maintenance and inspection of the surface water control system will identify any areas that require repair.

5.3 LANDFILL GAS EXTRACTION SYSTEM

The operation of the LFG extraction system is dependent on the proper functioning of the LFG extraction wells, trenches, wellheads, transmission piping, condensate collection knockouts, transmission valving, blower, and flare. This section provides a brief discussion of potential operational concerns based on past gas system experience.

5.3.1 Well Replacement

If a LFG extraction well or trench is damaged or clogged it may need to be replaced if maintenance as described in Section 4.0 is not effective. This section describes two potential LFG well or trench replacement scenarios. They are: 1) partial replacement, which includes ground seal and wellhead, and 2) full well replacement.

5.3.1.1 Partial Well Replacement

The wellhead contains a valve and flange connection to a flexible hose which connects the well to the lateral. Damage to the flexible hose, flange or valve or breaks due to material fatigue may create the need to replace the wellhead assembly. See construction drawings for typical wellhead.

To replace, assuming that the well has been isolated from the lateral or header by valving or installation of an inflatable plug, are as follows:

1. Inventory damaged well, and wellhead parts and purchase replacements.
2. Disconnect the flexible hose.
3. Disconnect the valve.
4. Remove gasket from flange face and smooth flange face with sandpaper.

*** CAUTION ***

WELL MAY BE EXHAUSTING LANDFILL GAS; PERSONAL PROTECTION MAY BE REQUIRED.

5. Check pressure gauge and gauge tap.

6. Connect flexible hose to lateral.
7. Replace the valve assembly and tighten bolts to manufacturers required torque.

*** CAUTION***

NEW GASKET MAY BE REQUIRED.

8. Connect flexible hose to valve.
9. Close new valve.
10. Remove inflatable plug from lateral (if used).
11. Open valve and inspect for leakage.
12. Monitor pressure gauge and rebalance well system as described in Section 3.0.
13. Repair landfill cover system as described in Section 4.0.

If a wellhead is damaged due to a vehicle (such as a mower) striking it, the ground seal may be damaged as well as the vertical riser pipe and wellhead assembly. If this condition is suspected, excavation of the landfill cover around the wellhead is necessary to replace the seal. The well seal specifications are contained in the construction documents and are applicable to such repairs.

For damaged pipe, remove the damaged section. Trim surface and clean pipe exterior to prepare for installing coupling. Extend new pipe section to required height above final grade. Install new flange fitting onto pipe and reassemble wellhead connections.

Backfill excavations with the same type of landfill cover layer material excavated. The original construction specifications provide the material and installation requirements. The well/ground seal shall be installed as the excavation is filled. All disturbed soil shall be revegetated in accordance with Section 4.0.

5.3.1.2 Full Well Replacement

Full well replacement will require a contractor. The construction specifications contained in the remedial action construction documents provide the requirements for materials and installation of a new well. The replacement well should be installed 10 to 15 feet from the old well and upslope from the old well. This will allow the new well's potential influence on existing wells will be similar to the one being replaced. The location of the new well should be close enough to allow for extending the header/lateral pipe.

The general steps for well replacement are:

1. Disconnect existing wellhead and plug the LFG lateral where disconnected.
2. Prepare new well site by stripping topsoil and preparing an area to temporarily stage the waste removed during drilling. This temporary staging area can be a bermed area, a pit excavated through the landfill cover or a rolloff box.
3. Remove wellhead and well seal.
4. Remove top 10 feet of the existing well after filling the well with grout.
5. Reseal existing well site with clay cover.
6. Drill and install new well in accordance with the construction specifications.
7. Reconnect the LFG lateral to additional lengths of piping needed for the new well.
8. Install wellhead assembly.
9. Replace clay cover and install well seal.
10. Replace cover in areas of trenching or other disturbances.

11. Revegetate in accordance with Section 4.0.

5.3.2 Loss of Vacuum at Wellhead

During regular inspection, the LFG pressure is recorded throughout the system. When a loss of vacuum is noted during routine maintenance, the operator needs to follow a systematic approach to determine the cause of vacuum loss. The following approach is suggested. Site specific conditions may affect this procedure.

1. Determine amount of vacuum loss by comparing current vacuum reading to previously recorded readings.
2. Determine extent of the affected area by measuring vacuum loss throughout the LFG extraction system. If entire field is affected, check blower/flare station conditions.
3. Check LFG flow rates at measuring points. If the LFG flow rate is normal, then a leak in the line should be suspected.
4. Check all surface features in affected part of the LFG extraction system for damage such as holes in the flexible hose, wellhead damage, valve positioning, etc.
5. Check liquid levels at knockout locations.
6. Check blower condition for damage or motor malfunction.
7. Check monitoring points for oxygen content.

Based on inspection, perform necessary maintenance or repair.

5.3.3 Oxygen in LFG Extraction System

Air leaks within the LFG extraction system may allow oxygen to enter the system. The most obvious indicator of air leaks will be an excessive percent of oxygen detected during monitoring. Other signs of air leaks are hissing noises at above ground structures or a large pressure drop over a short distance of LFG header piping (> 1-inch WC pressure drop per 100 feet of pipe). Initially, butterfly valves on the wells should be adjusted to limit excessive oxygen readings due to large vacuum at the wells. If excessive amounts of oxygen exist after the butterfly valves have been adjusted, verify the integrity of the LFG extraction system as described and identify air leaks as follows:

1. Turn off the blower and shut down the flare system.
2. Manually open electrically actuated valve at the Blower/Flare Station. Close butterfly valves at the wells.
3. Manually start blower and develop a vacuum of approximately 35 inches WC (static design pressure at the blower).
4. Manually close flame-out safety valve at the blower and turn off the blower, sealing off the header system with a residual negative pressure.
5. Monitor pressure in the header system for a minimum of 5 minutes after the blower is turned off.
    a. If the vacuum remains constant (varies less than 2 percent), commence system startup and balancing activities.
    b. If the vacuum decreases with time, isolate system components by inserting inflatable sewer plugs in the header risers and reapplying vacuum to the system. Locate leaks by starting this procedure at the furthest branch from the blower and progressing to the blower. Prior to system startup and

balancing activities, make repairs and retest system. Repeat this procedure until the vacuum remains constant (varies less than 2 percent in 5 minutes).

6. Some common areas where air leaks occur are:
   a. Loose gasket at the blind flange on the header riser.
   b. Loose clamp at the flexible hose on the wellhead.
   c. Broken sample port.
   d. Knockout cover flange leaks.

5.3.4 Power Failure

A power failure will directly impact the LFG extraction system by shutting down the blower which is creating the vacuum. Temporary power outage is not a problem; however, relighting of the flare may be required. When the blower is out of service, the electrically activated valve at the flare will close to prevent the LFG from passively venting.

5.3.5 Condensate Blockage

If the LFG header system has a large pressure drop in a short distance (> 1-inch WC pressure differential per 100 feet of pipe) and normal amounts of oxygen are measured, this is a potential sign of condensate blocking the flow of LFG in the LFG header. This blockage is most likely due to differential settlement of the landfill and sags occurring in the piping. Blockage of the LFG piping system may go unnoticed for some time because, with a looped header system, LFG will have an alternate route to travel to the blower/flare station. Careful observation of the pressure drop in segments of the LFG extraction system piping are required to detect a blockage in a looped system.

When a condensate blockage is discovered, many times its exact location cannot be determined. For example, a differential pressure in excess of 1-inch WC per 100 feet of piping may be observed between two LFG header pipes or two LFG extraction wells. If the two monitoring points are a great distance apart, then further monitoring work is necessary to pinpoint the blockage location.

When the blockage is pinpointed, insert inflatable sewer plugs in the upstream and downstream of the LFG header risers to isolate this portion of the LFG header system. Next, excavate the LFG header and repair the blockage by replacing the pipe or raising the sag to provide a uniform slope.

5.3.6 Flare Does Not Stay Ignited

The flare may not stay ignited. The predominant causes of this condition are excessive wind and insufficient methane. The flare will need to be reignited by following startup procedures as described in Section 3. Lack of methane can be the result of several factors. Air leakage into the system may dilute the LFG to a low BTU value and can be identified by oxygen monitoring. When the system has been operated for a long period, the methane generation rate may be insufficient to maintain a flame.

At this point, periodic operation may be used or the LFG extraction system may be converted to a passive system. Monitoring to determine whether or not compliance with State of Wisconsin air emissions limits is occurring will be used to decide when the flame is no longer needed.

5.4 CONDENSATE EXTRACTION SYSTEM

The main components of the condensate extraction system are the electric pumps and level controls.

5.4.1 Condensate Pump Failure

Monthly monitoring of the condensate sumps will show if pumps are working. If the pumps are found not to be working replacement or repair may be required.

The accumulation of solids within the sump can cause the pump to fail or run at reduced capacity. In this case cleaning the pump and sump of accumulated solids will correct pump efficiency.

5.5 GAS MIGRATION MONITORING SYSTEM

The most typical operating problem with the LFG probes is damage from contact with heavy equipment. Damaged LFG probes must be replaced.

SECTION 6.0

MONITORING AND TESTING

This section discusses where monitoring and test sampling must be performed on the CDCL Source Control systems. This monitoring and inspection plans provide details of the monitoring and sampling requirements.

6.1 LANDFILL COVER SYSTEM

The landfill cover system will not be tested after construction except for potential nutrient testing of the topsoil. The topsoil is readily accessible for sampling at any point on the landfill.

6.2 SURFACE WATER CONTROL SYSTEM

Surface water control system monitoring and testing can be performed at any location along ditches or at the discharge of the sedimentation basin.

6.3 LANDFILL GAS EXTRACTION SYSTEM

6.3.1 Introduction

This LFG Monitoring Plan identifies procedures for collection of data in accordance with Sections II.3.B. and II.4.B. of the Statement of Work (SOW) for the Source Control Remedial Design and Remedial Action at the CDCL. The monitoring and test data will be used to verify that the CDCL site is in compliance with Chapter NR 445 WAC emission limits for hazardous pollutants and with the requirements identified in s. NR 506.07(3) WAC relative to LFG migration. Monitoring locations, parameters, and frequencies are provided in Table 6-1.

LFG monitoring will include sampling and testing of the raw LFG at the blower for the first two years. The LFG flow rate will be measured at the flare and used to estimate air emission rates and quantity of LFG collected by the LFG extraction system. Potential LFG migration will be monitored at probes located at the landfill perimeter for the first two years quarterly and when odors or stressed vegetation is detected thereafter.

The LFG extraction system is designed to allow regular monitoring of the necessary parameters without interruption of the system. At the wellhead, the LFG pressure (vacuum) and flow can be read by connecting gauges to applicable ports across the orifice plate. Gas and temperature can be sampled from these ports.

Along the LFG transmission piping, there are several knockouts. LFG sampling and pressure (vacuum) readings can be taken at each knockout location.

TABLE 6-1
LFG EXTRACTION SYSTEM MONITORING PLAN

Location	Parameters	Frequency
Gas Migration Probes, GP-1 through GP-13	Oxygen, pressure, methane, temperature, barometric pressure	When odors and/or stressed vegetation is detected.
GW-I through GW-10, GT-11 through GT-24	Oxygen, pressure, methane, temperature, barometric pressure	Annually
Blower Flare Station	Performance monitoring parameters: Volume, pressure, oxygen, methane	Annually
Blower Flare Station	Air emissions parameters: Constituents in Table 6-2	First Quarter (First and Second Years)
Blower Flare Station	Analytes detected in First Quarter Samples (Benzene and Vinyl Chloride Minimum)	Second, Third, and Fourth Quarters

An orifice plate is installed between the blower and the flare for LFG flow measurement. An orifice plate is also installed on the incoming lines to determine LFG flow rates from each branch if needed for troubleshooting the system. The ports on each side of the orifice plate will allow pressure readings and sampling.
The LFG extraction system components including exposed piping, valves, wells, and sumps will be visually inspected annually for integrity. Any system damage will be repaired or replaced as soon as practical.

The LFG migration monitoring probes are designed for monitoring oxygen and methane with a direct reading' instrument

6.3.2 LFG Migration Monitoring

LFG probes will be monitored quarterly for the first two years and then as needed upon detection of odors or stressed vegetation. LFG probe locations are shown on Drawing No. 2 of the CDCL Source Control drawing set. The parameters to be monitored are provided in Table 6-1. Pressure readings will be taken using a pressure gauge. Oxygen and methane will be measured using an oxygen meter and a combustible gas indicator (CGI), respectively.

6.3.3 LFG Extraction Performance Monitoring

LFG extraction wells will be monitored annually when the system is running.

6.3.3.1 LFG Emissions Testing

Extracted LFG samples (raw) will be collected from the LFG header at the flare station and analyzed to determine whether LFG emissions meet the allowable emission rates for specific constituents from Chapter NR 445 WAC, including SOW VOCs (see Table 6-2 for specific compounds) during the first two years of operation. The LFG flow rate will be calculated by differential pressure measured across an orifice plate installed in the header at the flare station. The observed LFG flow rates and concentrations will be used to calculate contaminant mass emission rates.

The first quarter LFG samples from the header pipe at the flare station will be analyzed for the compounds listed in Table 6-2. Second, third, and fourth quarter LFG samples will be analyzed for those compounds detected in first quarter testing which have the potential to exceed air emission limits in Chapter NR 445 WAC. At a minimum, benzene and vinyl chloride will be analyzed using EPA Method TO-14. Mass emission rates will be calculated for those compounds which are detected, to determine whether the site has the potential to emit hazardous contaminants in excess of regulated levels (Chapter NR 445 WAC). If the calculated mass emissions rates are above the regulatory levels, treatment by combustion will continue.

TABLE 6-2
LFG COMPOUNDS AND NR 445 EMISSION RATES
CITY DISPOSAL CORPORATION LANDFILL

NR 445 Compound	Allowable Emission Rate
TABLE 1	
1,1 Dichloroethane	67.4568 lbs/hour
Ethylbenzene	36.228 lbs/hour
2-Hexanone (methyl n-butyl ketone)	1.6656 lbs/hour
Trichloroethene	22.4856 lbs/hour
Naphthalene	4.1641bs/hour
Methylene Chloride	29.148 lbs/hour
1,1,2,2-Tetrachloroethane	0.5832 lbs/hour
Tetrahydrofuran	49.1352 lbs/hour
Toluene	31.2312 lbs/hour
Xylene	36.228 lbs/hour
TABLE 3A	
Benzene	300.0 lbs/year
Vinyl chloride	300.0 lbs/year
TABLE 3B	
o-Toluidine	25.0 lbs/year
Urethane (Ethyl carbamate)	250.0 lbs/year
Polycyclic Organic Matter (a total of all listed compounds): Benz(a)anthracene Benzo(b)fluoranthene Benzo(a)pyrene Dibenz(a,h)acridine Dibenz(a,j)acridine Dibenz(a,h)anthracene 7H-Dibenzo(c,g)carbazole Dibenzo(a,h)pyrene Dibenzo(a,i)pyrene Indeno(1,2,3-cd)pyrene	250.0 lbs/year

TABLE 6-2 (Continued)
LFG COMPOUNDS AND NR 445 EMISSION RATES
CITY DISPOSAL CORPORATION LANDFILL

NR 445 Compound	Allowable Emission Rate
Nitrosoamines (a total of all listed compounds): N-Nitrosodi-n-butylamine N-Nitrosodiethanolamine N-Nitrosodiethylamine N-Nitrosodimethylamine p-Nitrosodiphenylamine N-Nitrosodi-n-propylamine N-Nitroso-N-ethylurea N-Nitroso-N-methylurea N-Nitrosomethylvinylamine N-Nitrosomorpholine N-Nitrosonornicotine N-Nitrosopiperidine N-Nitrosopyrrolidine N-Nitrososarcosine	250.0 lbs/year
Acrylonitrile	25.0 lbs/year
Aflatoxins	25.0 lbs/year
2-Aminoanthraquinone	250.0 lbs/year
o-Anisidine and o-anisidine hydrochloride	250.0 lbs/year
Benzotrichloride	250.0 lbs/year
Beryllium and beryllium compounds, as Be	25.0 lbs/year
Cadmium and cadmium compounds, as Cd	25.0 lbs/year
Carbon tetrachloride	25.0 lbs/year
Chloroform	250.0 lbs/year
p-Cresidine	250.0 lbs/year
2,4-Diaminoanisole sulfate	250.0 lbs/year
2,4-Diaminotoluene	250.0 lbs/year
1,2-Dibromo-3-chloropropane (DBCP)	250.0 lbs/year
1,2-Dibromoethane (EDB)	250.0 lbs/year
3,3'-Dichlorobenzidine	250.0 lbs/year
1,2-Dichioroethane (EDC)	25.0 lbs/year
Di(2-ethylhexyl)phthalate (DEHP)	250.0 lbs/year
Diethyl sulphate	25.0 lbs/year

TABLE 6-2 (Continued)
LFG COMPOUNDS AND NR 445 EMISSION RATES
CITY DISPOSAL CORPORATION LANDFILL

NR 445 Compound	Allowable Emission Rate
3,3'-Dimethoxybenzidine (o-Dianisidine)	250.0 lbs/year
4-Dimethylaminoazobenzene	250.0 lbs/year
3,3'-Dimethylbenzidine (o-Tolidine)	250.0 lbs/year
Dimethyl carbamoyl chloride	250.0 lbs/year
1,1-Dimethyl hydrazine	250.0 lbs/year
Dimethyl sulfate	25.0 lbs/year
1,4-Dioxane	250.0 lbs/year
Epichlorohydrin	300.0 lbs/year
Ethylene oxide	25.0 lbs/year
Ethylene thiourea	250.0 lbs/year
Formaldehyde	250.0 lbs/year
Hexachlorobenzene (HCB)	25.0 lbs/year
Hexamethyl phosphoramide	250.0 lbs/year
Hydrazine and hydrazine sulfate	250.0 lbs/year
Hydrazobenzene	250.0 lbs/year
Lindane and other hexachlorocyclohexane isomers	25.0 lbs/year
4,4'-Methylene bis(2-chloroaniline) (MOCA)	250.0 lbs/year
4,4'-Methylenedianiline (and dihydrochloride)	250.0 lbs/year
Methyl iodide	250.0 lbs/year
Nickel compounds other than nickel subsulfide, as Ni	250.0 lbs/year
2-Nitropropane	250.0 lbs/year
Polychlorinated biphenyls (PCB)	0.10 lbs/year
1,3-Propane sultone	250.0 lbs/year
B-Propiolactone	250.0 lbs/year
Propylene oxide	250.0 lbs/year
Propylenimine	250.0 lbs/year
2,3,7,8-Tetrachlorodibenzo-p-dioxin	0.0001 lbs/year
Thiourea	250.0 tbs./year

TABLE 6-2 (Continued)
LFG COMPOUNDS AND NR 445 EMISSION RATES
CITY DISPOSAL CORPORATION LANDFILL

NR 445 Compound	Allowable Emission Rate
TABLE 4	
Vinyl Acetate	2.4984 lbs/hour
TABLE 5	
Chloroethane (ethyl chloride)	2,103,914 lbs/year
1,2 Dichloropropane	842 lbs/year
Toluene	84,157 lbs/year
Ethyl Benzene	210,391 lbs/year
Vinyl Acetate	42,078 lbs/year
Non NR 445 Compound	Allowable Emission Rate
Acetone	No standard set
2-Butanone (methyl ethyl ketone)	No standard set
Trans-1,2-Dichloroethene	No standard set
4-Methyl-2-pentanone	No standard set
Tetrachloroethene	No standard set
1,1,1-Trichloroethane	No standard set

In the first quarter of the second year, LFG samples from the header pipe at the flare station will again be analyzed for the entire list of compounds in Table 6-2. Following this sampling and analysis event, subsequent quarterly sampling and analysis will be limited to those compounds which exceed air emission regulations.

6.3.3.2 LFG Emission Rate Calculations

The volumetric flow rate of LFG will be determined using static pressure readings across an orifice by the following equation:

$Q = 6KD^2 (h/p)$ ½ where

Q = volumetric rate of flow in ft^3/min (cfm)
K = coefficient of air flow (dimensionless)
D = orifice diameter in inches
h = static pressure drop across orifice, in inches of water
p = LFG density, lb/ft^3
(from ACGIH 1992)

The following is an example calculation for typical conditions:

Given: K = 0.6
D = 2 inches
Pressure Drop = 18 inches of water
LFG Density = 0.07 lb/ft^3

Calculate: $Q = 6 \times 0.6 \times 2^2 \times * 18/0.07)^{1/2} = 231$ cfm

Mass emission rates will be estimated by using the following method.

Given: ug contaminant/volume of sample, dry standard cubic feet (DSCF) bulk LFG flow rate in DSCF/min

Calculate: lb contaminant/DSCF = ug/DSCF x 1 g/10^6 ug x 1 kg/10^3g x 2.2 lb/kg
lb contaminant/min = lb contaminant/DSCF x DSCF/min
lb contaminant/yr = lb contaminant/min x 60 min/hr x 24 hr/day x 365 day/yr

6.3.4 Reporting and Schedule

Annual routine reports for the LFG extraction system will include:

- Operation records.
- Performance monitoring data.
- LFG flow rate(s) data and mass emissions calculations.

6.4 CONDENSATE EXTRACTION SYSTEM

Condensate levels can be measured at each sump. Volume estimates can be made by measuring condensate pumped from condensate collection tank and by determining individual pump volumes from pump on time meter.

6.5 RECORDKEEPING AND REPORTING PROCEDURES

Monitoring, inspection, and testing documentation reports will be prepared and submitted to U.S. EPA and the WDNR annually.

SECTION 7.0

ALTERNATIVE OPERATION

This section addresses alternative operation for the CDCL Source Control systems if failure would occur. Maintenance will be a function of Manufacturer's recommendations and experience gained by operating the site systems. No alternative maintenance plans are proposed at this time.

7.1 LANDFILL COVER SYSTEM

Landfill cover system failures are not anticipated. However, when landfill cover areas are being repaired, temporary geomembranes may be used to restrict infiltration when it is determined critical to maintain gas extraction system operation. The geomembrane will be removed and replaced by low permeability soils when the repairs are completed.

7.2 SURFACE WATER CONTROL

In the event of a failure, surface water controls would be supplemented by silt fencing and erosion control mats. If needed, the earth basin can be modified by deeper excavation or widening to improve hydraulic performance. If required, chemical addition to surface water could be performed manually at the basin inlet to enhance settlement and improve water quality.

7.3 LANDFILL GAS EXTRACTION SYSTEM

In case of mechanical failure of the blower, or maintenance to the flare, the gas system can be sealed by closing the LFG header line valves. This will allow containment of the LFG. If power is disrupted for extended periods of time, a generator can be connected to the LFG extraction system temporarily. In the event the blower is inoperable or requires extensive maintenance a replacement blower can be used to operate the system.

In case of failure of a LFG header line, the failed line can be isolated and repaired without taking the whole LFG extraction system out of service. LFG will continue to be conveyed by the remainder of the looped LFG header line.

Portable candle flares will be available if the site flare is out of service for an extended period of time. The discharge side of the blower will be temporarily connected to the portable flare.

7.4 CONDENSATE EXTRACTION SYSTEM

Removal of collected condensate from the collection sumps under normal conditions will be done with the submersible pumps. In the event the pumps become inoperable a quick-disconnect coupling is provided at each sump for removal of condensate by a vacuum truck. The system can continue to be operated in this manner until normal condensate collection and removal can occur.

7.5 GAS MIGRATION MONITORING SYSTEM

The probes are at fixed locations. The only contingency to consider is supplemental soil gas readings due to visible signs of LFG distress (i.e., vegetation stress). This can be done with barhole probes. If the condition persists, a permanent probe can be installed.

SECTION 8.0

CORRECTIVE ACTIONS FOR SYSTEM FAILURES

This section presents a description of potential corrective actions to be implemented should any CDCL Source Control systems fail.

8.1 LANDFILL COVER SYSTEM

Potential corrective actions as described in Section 7.1 should be followed if the landfill cover system erodes or settles. No other system failures are anticipated.

8.2 SURFACE WATER CONTROL

The surface water control channels and sedimentation basins have been designed with excess capacity. If a ditch becomes blocked, collected surface water may run past the sediment basin. After the site is revegetated, this is not a concern. During construction, the contractor will have equipment available to repair the surface water control structures immediately should this condition occur. In addition, the contractor will implement temporary surface water controls, such as silt fences to prevent off-site sediment migration.

8.3 LANDFILL GAS EXTRACTION

If a flare flameout occurs, the flare and blower controls are interlocked to prevent the blower from continuing operation. Corrective actions to address damage or blockage to the LFG header systems were discussed in Section 7.3.

8.4 CONDENSATE EXTRACTION SYSTEM

The system operates under a closed loop design. That is, the conveyance pipe and the pump discharge are within the vacuum pressurized LFG system. If a failure, such as a break, occurs in the pipe, the vacuum of the LFG extraction system will prevent some of the LFG from escaping. If a breach occurs in the LFG header section outside the limits of waste, air intrusion will require a shutdown of the LFG extraction system for repairs to be carried out.

8.5 LFG MIGRATION MONITORING SYSTEM

Failure of the LFG probes will be repaired as soon as possible. If repair is not possible, new probes will be installed as appropriate. Failure of a LFG probe typically is the result of physical damage or filling with water.

SECTION 9.0

SAFETY

This section discusses safety issues related to site operation.

9.1 SAFETY CONSIDERATIONS

During all construction and operation at the site, the RA Health and Safety Plan (HASP), developed by the Remedial Contractor, will be followed.

9.1.1 Potential Safety Hazards

The HASP contains a detailed discussion of the potential safety hazards at the site. This document should be reviewed for operation, maintenance or repair activities.

9.2 SAFETY PRECAUTIONS

9.2.1 Gas Monitoring

The following safety precautions should be adhered to by personnel when monitoring for combustible gas:

- All personnel involved in monitoring on site are trained in the hazards of LFG.
- Hard hats and glasses must be worn at all times.
- Absolutely no smoking at any time within the landfill area.
- A fire extinguisher must be readily available, when monitoring as concentrations within structures and/or confined spaces.
- Adhere to the monitoring requirements of the RA HASP.

9.2.2 General Safety Practices

The following listed procedures will be implemented to reduce the potential for emergency situations.

- All employees at the landfill will be trained in proper procedures for reporting accidents, injuries, and fires.
- Fire extinguishers will be provided in all site buildings and in all vehicles used on site. Each extinguisher will be appropriate for the types of fires likely to occur and will be checked or serviced as appropriate. Discharged fire extinguishers will be removed and replaced with fully charge units.
- All employees will be trained to identify hazards at the landfill. Potential hazards will be reported to the supervisor.
- NO SMOKING shall be enforced within the landfill area and near fuel storage facilities.

9.3 EMPLOYEES RESPONSIBILITY FOR SAFETY

Before beginning a job, the employee should satisfy himself/herself that the task can be performed without undue risk of injury. If the employee is in doubt as to his/her ability to perform the work or the precautions to be taken, the employee should call this to the attention of their supervisor.

9.3.1 Contingency Planning

Before commencing any work that may be hazardous, care should be taken to establish a safe procedure. Where more than one employee is engaged in the same job, all employees concerned

should understand the procedures to be followed. Under no circumstances should safety be sacrificed for speed.

9.3.2 Intoxicating Beverages and Drugs

Use or possession of intoxicating beverages or drugs on facility premises, on the job, or during working hours is prohibited and may result in disciplinary action. Any employee taking drugs prescribed by a physician or over-the-counter drugs which could impair the employee's assigned work should report this fact to his/her supervisor.

9.4 VISITORS

- Visitors which have obtained required clearances will be escorted at all times.
- Visitors should be cautioned not to touch anything, especially controls and rotating electrical and mechanical equipment. Safe distance should be maintained from all site equipment.
- All visitors are required to wear hard hats and safety eyeglasses.
- Visitors should be prohibited from hazardous, confined areas.
- Vendor representatives visiting the site should be advised of any existing but unidentified hazards that would affect their work.

9.5 EMERGENCIES

9.5.1 Accidental Spills

In the event of an accidental spill on-site, the following procedures will be implemented:

- Determine location, extent, type, and, if possible, cause of release (e.g., leachate, contaminated stormwater, fuel spill, etc.).
- Inspect the spill area to identify the type of spill, assess the probability of environmental damage, and implement safety and emergency response procedures.
- Report the spill to the site manager in accordance with Section 10, Reporting.
- Take action necessary to mitigate possible environmental damage.

9.5.2 Fires/Explosion

In the event of a landfill fire or explosion contact the local fire department and implement the following procedures:

- Extinguish small fires using the appropriate extinguishers and/or on-site soils.
- Notify on-site personnel and implement safety and fire control procedures.

In the event of a landfill fire, the LFG extraction system will be shutdown to limit intrusion of oxygen. The extent of the suspected oxidation area will be noted by inspector based on surface evidence. The inspector will notify on-site personnel and site representative. Intrusive measures will be started in a controlled manner and may include:

- Saturating the cover soil or adding cover soil to restrict air infiltration.
- Excavate and extinguish with appropriate materials.

- Pump nitrogen below cover to displace oxygen.

9.5.3 Severe Weather

- Proceed to the nearest, safest shelter area.
- Following severe weather, perform a site survey to determine if any damage or unsafe/hazardous working conditions exist and the location and nature of the damage or hazardous condition.

9.5.4 Emergency Procedures

Emergency procedures will be posted as necessary in locations accessible to all employees. Emergency information includes:

- The name, location, and telephone number of medical treatment facilities and ambulance service, fire department, and local law enforcement authority.

Instructions on Procedures - New personnel will be instructed on emergency procedures used at the site.

Responsibility of Employee - It is the responsibility of every employee to know and remember his/her role in each emergency procedure at the site.

9.6 SAFETY EQUIPMENT

All facility personnel shall wear appropriate attire and protective equipment, such as hardhats, safety glasses, and safety shoes whenever on the site property. Specific safety equipment required for any building or area of the site will be posted with their equipment. Employees shall refer to RA HASP for information on appropriate equipment selection.

9.7 FIRST AID

9.7.1 Personnel Accidents

Administer first aid as necessary for on-site personnel accidents or injuries. Follow normal first aid steps for assessing conditions and notify emergency response personnel if appropriate. Report all on-site accidents involving injuries in accordance with Section 10, Reporting. The location of the nearest medical facility and route to the facility will be provided in the HASP.

SECTION 10.0

REPORTING

In accordance with the ROD, WMWI shall provide U.S. EPA and WDNR with periodic reports. Reports shall indicate the progress of the Remedial Action and monitoring. During construction phases reporting shall be done monthly. For operation and maintenance, including LFG monitoring, the reporting shall be annually. Discharge monitoring reports are submitted monthly in accordance with the GCOU.

This section describes the types of reports which will be prepared. In addition, standard forms are provided.

Several miscellaneous reports are discussed in this section and will simply be attachments to either a monthly or annual report. This includes accident reports, spill and cleanup reports, laboratory test results, fire and cleanup reports.

10.1 MONTHLY REPORTS

Discharge monitoring reports provide information on the operation and maintenance of the groundwater treatment system. Landfill cover, surface water control and LFG extraction system maintenance will be included in this report as necessary. The landfill cover and surface water control features have stabilized and do not require significant maintenance at this time.

10.2 ANNUAL REPORT

The annual report will provide a summary of effectiveness of the RA. Data on system operation, operating problems, and monitoring data will be supplied. This report will provide the formal transmittal of laboratory test data or field measurements to the agencies. Each report will include an assessment of the effectiveness of the systems in achieving the RA requirements and proposed operational changes if required. In general, the report shall contain the following:

1. Summary of operational conditions, maintenance performed, and repairs required on the RA systems, including:
   a. Landfill cover system.
   b. Surface water control.
   c. LFG extraction system.
   d. Condensate extraction system.
   e. LFG migration monitoring system.
2. Tables providing quantitative data on the systems, including:
   a. LFG blower operating time.
   b. Methane concentration at probes.
   c. Condensate volume collected.

Tables will typically provide historic average or change and current period data.

3. Maintenance procedures implemented in reporting period will be summarized. Any required changes to maintenance frequency will be discussed.

4. Repairs implemented outside of the scope of normal maintenance will be reported.
5. Summary of effectiveness of the remedial action system.
6. Appendices will be attached to the annual report when necessary. The appendices generally will include:
    a. Laboratory test data.
    b. Field measurement logs.
    c. Maintenance reports.
    d. Repairs reports.
    e. Incidence reports.

10.3 MISCELLANEOUS REPORTS

During operation of the RA, miscellaneous reports may be provided from time to time. These documents will be attached to the annual report. This section discusses the format and requirements for typical miscellaneous reports.

10.3.1 Laboratory Test Results

Laboratory test results from groundwater treatment system are attached to the monthly discharge monitoring reports.

Previously WMWI demonstrated that our emissions are well below WDNR limits and LFG is no longer sampled.

10.3.2 Landfill Gas Well Inspection

The LFG extraction wells will be inspected on a annual basis for integrity.

10.3.3 LFG Probe Monitoring Report

The LFG probes will be monitored when odors are detected or stressed vegetation is observed. A form similar to the one attached to this section will be used to record the data.

10.3.4 Flare Station Monitoring Report

The flare station will be inspected on a annual basis for maintenance purposes.

10.3.5 Accidental Spills

Accidental spills of leachate or any other potentially harmful or hazardous substance will be immediately reported and logged in the site log. The report and log entry should include:

- ☐ Time/date of incident or its discovery.
- ☐ Type of release and effects.
- ☐ Source.
- ☐ Response and effectiveness.
- ☐ Agencies contacted.
- ☐ Corrective actions planned and scheduled.

A list of persons/agencies to contact in the event of a spill should be kept in an easily accessible location.

10.3.6 Incident Report

An incident report form will be filled out for miscellaneous occurrences on-site that impact construction or operations. These may include fires, equipment breakage/damage,

accidents/injuries; and weather induced damage. This form will include the following information:

- Date/time of incident.
- Type of occurrence.
- Personnel reporting.
- Personnel involved.
- Equipment involved.
- Summary of actions.

10.4 SAMPLE FORMS

The following pages provide example forms which are proposed for reporting and inspections. Additional forms or alternations may be required to meet the needs of the site after the systems are in operation.

	FLARE STATION MONITORING REPQRT **LANDFILL GAS EXTRACTION SYSTEM** CITY DISPOSAL CORPORATION LANDFILL	

Barometric Pressure:					
Weather:					
Inside Dia. of the Pipe Between Blower and Flare:					
Gas Instrument Type:					
Flow Measuring Device:					
Blower Amperage:					
Location	Pressure +/- (In. W.C.)	Percent Methane	Percent Oxygen	Gas Temp. (°F)	Total System Flow (cfm)
Before Electric Acuated Valve					
Blower Discharge					
				Pilot tube reading	
Comments:					
			Date of Monitoring:		
			By:		

Inspection Log
Landfill Gas Collection System
City Disposal Corporation Landfill

Date:_____

Inspector:_____

Gas System Component	Observation		Comment/Action
	Yes	No	
Wells/Header System			
Well heads intact/valves operating			
Condensate collection sumps			
Gas monitoring data obtained			
Warning signs placed/intact			
Vegetative stress observed			
Final cover integrity verified			
Temperature gauge			
Condensate Collection Systems			
Knockout filled with water			
Condensate drained from flame arrestor			
Discharge station/spill containment and controls intact			
Blower/Flare Station			
Blower rotation performed			
Blower unit bearing checked			
Flare operating			
Control panel status lights 'ok'			
Propane supply adequate			
Electrically actuated valve operating			
Fence secure/locks installed			
Emergency instruction signs in place			
General Comments			

PERMANENT PROBE GAS MONITORING REPORT
LANDFILL GAS COLLECTION SYSTEM
CITY DISPOSAL CORPORATION LANDFILL

Combustible Gas Instrument Type: _____ Serial No.:_____
Date Last Calibrated:_____ Method:_____
Pressure Instrument Type: _____ Serial No.:_____
Water Level Instrument Type: _____ Serial No.:_____
Weather Conditions: _____ Barometric Pressure:_____

Monitor Point	Time	Pressure In. W.C. (+/-)	Percent Methane	Comments

Note: All readings are 0-100% methane by volume in air.

All pressure readings are expressed as inches of H_2O.

DATE:_____
By:_____

GAS WELL MONITORING REPORT
LANDFILL GAS COLLECTION SYSTEM
CITY DISPOSAL CORPORATION LANDFILL

Combustible Gas Instrument Type:	Serial No.:
Date Last Calibrated:	
Sampling Device: Aspirator Bulb/Electric Pump (Circle One)	
	Serial No.:

Well No.	Time	Percent Methane	Percent Oxygen	Valve Position (% Open)	Well* Pressure (+/-) (In. W.C.)	Well Temp. (°F)	Comments

* Taken from a sample port on 8-inch well head flange

Completed By: _____

Date: _____

WELL FIELD MAINTENANCE LOG			
LANDFILL GAS COLLECTION SYSTEM CITY DISPOSAL CORPORATION LANDFILL			
Date:			
Well No.:			
Location:			
Well (*Check, as appropriate*)			
Sample Ports		Protective Well Cover	
Flexible Hose		Lateral	
Butterfly Valve		Well Casing	
Headers (*Check, as appropriate*)			
Air Leak		Road Crossing	
Condensate Blockage		Header Riser	
Crushed Pipe		Cleanout Tee	
MAINTENANCE (Describe Activities)			
Wells			
Header			
Completed by:			

BLOWER/FLARE MAINTENANCE LOG LANDFILL GAS EXTRACTION SYSTEM CITY DISPOSAL CORPORATION LANDFILL					
Date:					
Completed By:					
Blower (*Check, as appropriate*)					
Motor Starter		Pipe Jacket		Building Repair	
Lubrication		Pipe Insulation		Methane Detector	
Sample Ports		Pipe Supports		Motor	
Electric Actuator		Fence		Paint	
Pipe Repair		Road Repair		Shaft Seal	
		Coupling		Shaft Guard	
Flare (*Check, as appropriate*)					
Flame Arrestor		Propane System		System Check	
Electrical Controls		Flare Tip			
Paint		Startup			
Alarm Light		Spark Plug			
MAINTENANCE (Describe Activities)					
Blower					
Flare					

APPENDIX A
EPA/WDNR CONDITIONS OF APPROVAL

APPENDIX B
BLOWER EQUIPMENT DATA

APPENDIX C
FLARE DATA

APPENDIX D
PUMPS

APPENDIX E
VALVES

APPENDIX F
ELECTRICAL DEVICES

APPENDIX G
PRESSURE GAUGES

APPENDIX H
RECORD DRAWINGS